

KILOGRAMMES

		mgr.	mgr.
International kilogramme KI		—	—
belonging to the Bureau ...			
International kilogramme KIII			
belonging to the Bureau ...	KI—KIII =	-0'1232	±0'0026
Kilogramme-type C belonging			
to the Bureau ...	C—KIII =	+0'3217	±0'0034
Kilogramme-type S belonging			
to the Bureau ...	S—KIII =	+0'4632	±0'0034
Standard kilogramme H for			
Spain ...	H—KIII =	-1'8762	±0'0034
Standard kilogramme Z for			
Austria ...	Z—KIII =	-1'3501	±0'0034

The present volume, like its two predecessors, is published by the Director of the Bureau under the authority of the Comité, and contains some account of the modes of comparison of the standards, with descriptions of the apparatus used, and a complete statement of the observations and of the methods of their reduction. The work of the Bureau has mainly included determinations of the lengths of certain standard metres and of the weights of certain standard kilogrammes for different Governments and authorities, as shown in the above tables.

These tables do not include the important comparisons of the British Standards with those of the Bureau, an account of which is given in a Report presented to Parliament by the Board of Trade last year, and in the Report of the Proceedings of the Committee for 1883.

The comparisons of the metres by Dr. René-Benoit, and those of the kilogrammes by M. Marek, were made in the same manner and after the same methods as those described in vols. i. and ii., to which we have previously referred.

M. Marek gives a thoughtful description of the excellent normal barometer and cathetometer in use at the Bureau, as well as of the methods of calibrating the thermometers used during the weighings. There are also illustrations of the apparatus used in ascertaining specific gravities, and of M. Stas's method for clearing the surfaces of metals by a jet of alcohol vapour, of which we regret that the demands on our space do not allow an account.

The many pages of observations and calculations which are given in this volume are clearly arranged and carefully printed. We doubt, however, whether it may be desirable to publish so much detail, particularly all the observations of the balances. Each Report of verification should evidently include all the observations, &c., from which the results have been obtained, but it would appear to be necessary only that the Government or authority directly interested should be furnished with a full detailed Report. Economy of time and money might be effected to readers and purchasers, and perhaps the objects of the Comité further advanced, by the omission in such publications of any unnecessary detail.

NOTES

THE Washington Prime Meridian Conference has adopted a resolution declaring the universal day to be the mean solar day, beginning, for all the world, at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day, and that meridian to be counted from zero up to twenty-four hours. The resolution further declares that the Conference expresses the hope that, as soon as practicable, astronomical and nautical days may be arranged everywhere to begin at mean midnight. Prof. Janssen, of France, moved that the Conference should express the hope that technical investigations to regulate and extend the application of the decimal system to the divisions of the circle and of time would be resumed, in order to permit of the extending of that application to all cases where it might present real advantages. The

motion was adopted, and the Conference adjourned until Wednesday.

M. BERTRAND, the Perpetual Secretary of the Paris Academy of Sciences in the Mathematical Section has been proposed as a candidate to fill the place vacated by the death of M. Dumas in the Académie Française. His nomination is certain, and will take place without opposition. It is almost customary for the Académie Française to offer a seat to one of the secretaries of the Academy of Sciences; Delambre, Fourier, Flourens, Cuvier, and Dumas enjoyed this honour in succession. Arago was offered it several times, but obstinately refused it. He strictly adhered to the old constitution of the Institut National as created by the Directory of the First Republic, which states that the five sections constitute the several parts of a living encyclopædia established to deliberate *in common* on many different questions, and that consequently no member of one section should be eligible to another. When the Restoration took place, the Institut was divided into independent academies, and the old practice of electing a person to several of them was revived. It has not been altered since 1848, although several attempts have been made in order to recall into existence the former republican organisation.

ON the night of Saturday, October 4, some interesting observations of lunar coronas and fog-bows were made at Ben Nevis Observatory. The mountain-top had been enveloped in mist for several days previously, but about 9 p.m. it began to clear, and by 11 o'clock the moon, partially eclipsed, was visible, surrounded by a strong double corona; all the colours from red to blue being seen in both rings. Measurements of these were taken by Mr. Dickson, Interim-Superintendent, with an instrument designed for the purpose by Prof. Tait. These gave:—Outer diameter of red—outer ring, 7° 46'; inner ring, 4° 52'. After midnight the sky became quite clear and the moon shone brightly, no corona being visible. At times, however, detached portions of very thin mist came up the north-west side of the mountain and brushed over the top. Whenever this occurred a strong corona again surrounded the moon, with a *third* set of rings, outside the other two, and much fainter, but sufficiently bright to allow of all the colours being distinguished. At 1.30 a.m. on October 5 the outer set of rings was more distinctly marked than before, and measurements were again taken. These gave:—Outer diameter of red—inner ring, 4° 6'; middle ring, 6° 2'; outer ring, 8° 10'. All these measurements are subject to an error of not more than ± 6'. At 1.15 a.m. a lunar fog-bow was visible on a fog bank to the northwards. From the edge of the precipice to north-north-east of the Observatory this appeared to consist of an outer ring, having a diameter of 75°, and an inner and fainter ring, diameter 65°, the space between the rings appearing almost quite dark, as if caused by a sharply-defined break in the fog. No colours could be distinguished.

FROM the *Alta California* we learn that the Lick Trustees have just received, through the kindness of Capt. Goodall, of the firm of Goodall, Perkins, and Co., important advices from Paris in regard to the glass disk which is needed to complete the 36-inch equatorial for the Lick Observatory. It will be remembered that the contract for two disks—one of flint and the other of crown glass—which are needed for the construction of an achromatic objective, was let to the celebrated firm of Alvan Clark and Sons in 1861. There were only two firms in the world who were capable of making glass disks of such size, nearly 40 inches in diameter. The Clarks employed one of these, Messrs. E. Feil and Co. of Paris, to cast the rough disks for them. The flint disk was cast in an unexpectedly short time, but the making of the crown glass disk has proved to be a matter of great difficulty, and this alone will have delayed the making of the large objective, and thus the completion of the Lick Obser-

vatory, by several years. The Lick Trustees will have all the Observatory, excepting the large telescope and the dome to contain it, finished and ready for work during 1885. As soon as two perfect disks of crown and flint glass are on hand, the focal length of the telescope can be calculated, and the size of the great dome determined upon; and nothing can be done until this focal length is known. Nineteen trials have been made by the Messrs. Feil to cast a perfect crown disk, and a delay of more than two years has been incurred through the difficulties and risks of the operation. It appears from the letter of Capt. Goodall to Capt. Floyd, which has been referred to, that Messrs. Feil have cast two disks, which they expect to be suitable for the purpose. The Captain visited their works early in September, and they were expected to ship one of the disks to Clark and Sons early in October. There is then reason to believe that the rough disks for the large telescope will soon be in the hands of the optician. The successful working of these disks into the proper curve for a perfect object-glass is a matter of the greatest difficulty, but the extraordinary skill which the Clarks have acquired leave no doubt that within two or three years after the receipt of a perfect disk the whole 36-inch objective (the largest possible) will be finished. While the objective is making, the dome and the mounting can be constructed, so that the whole delay is and has been due to the difficulties incident to the opticians' work. The work on Mount Hamilton has progressed as far as possible under the present conditions, and it will not be long before California possesses the most perfect observatory in the world, placed in the most favourable situation which can be found.

THE recent works of the United States Geological Survey, and especially the remarkable report of Capt. Dutton, have given an opportunity to Prof. Trautschold of Moscow, to draw a parallel between the geological structure of Colorado and that of European Russia, which appears in the *Bulletin* of the Moscow Society of Naturalists. In Russia, the Silurian, Devonian, Carboniferous Limestone, and Lower Permian series are marine deposits, while the Upper Permian is of fresh-water or terrestrial origin. The Trias and Lower Jurassic rocks are also continental deposits, - or seem to be so to a great extent, - while the Upper Jurassic groups are again of marine origin, as is also the Chalk, which contains only islands with land-vegetation. Three parts of the Tertiary series consist of terrestrial and fresh-water deposits, marine deposits appearing only in the south; and the Quaternary is also a continental formation. Such being, according to Prof. Trautschold, the structure of Russia, he had already concluded that in the Northern Hemisphere there was a general retreat of the sea during Palaeozoic times, and a growth of continents, upon which the Carboniferous and then the Permian floras largely increased, European Russia being, during the Triassic and the first half of the Jurassic periods, a continent with nearly the same outlines as now. During the second half of the Jurassic period, another subsidence of the continent, and an advance by it into the Northern Hemisphere, again took place, without reaching, however, the same level that it had had during the Palaeozoic period; the sea remaining shallow. A second retreat of the water took place during the Tertiary and Quaternary periods. Similar oscillations might well explain, in Prof. Trautschold's opinion, the structure of the Grand Cañon district, where the connection between the Jurassic and Triassic is as close as in Russia.

THE next ordinary general meeting of the Institution of Mechanical Engineers will be held in the large Lecture Theatre, University College, Shakespere Street, Nottingham, on November 5. The chair will be taken at 4 p.m., by the President, I. Lowthian Bell, F.R.S. The following papers will be read and discussed, as far as time will admit:—On the Mineral Wagons of South

Wales, by Mr. Alfred Slater, of Gloucester; on the Application of Electro-Magnets to the working of Railway Signals and Points, by Mr. Illius A. Timmis, of London; Second Report on Friction Experiments, by Mr. Beauchamp Tower, of London.

THE International Congress convened to deliberate upon the best means of preventing the spread of *Phylloxera vastatrix* was opened on Monday at Turin. Among the personages present were the Duke d'Aosta, Signor Grimaldi, Minister of Commerce, the Syndic of Turin, and the French, Greek, Spanish, Portuguese, Servian, and Roumanian Delegates to the Congress. After a short address of welcome from the Syndic of Turin, Signor Grimaldi explained the object of the Congress, and dwelt particularly upon the necessity of common legislative measures being adopted in all infected countries in such a form as not to interfere with the liberty of trade. It was, however, most requisite to raise barriers to the spread of the Phylloxera.

THE last issue of the *Transactions* of the Seismological Society of Japan (vol. vii. part 1) contains a paper by Prof. Milne on Earth Tremors, dealing successively with artificially produced tremors, natural tremors, and at some length with various instruments constructed to record these minute movements. Micro-seismology, by the way, appears to be the name of this new branch of science. The results which have been obtained so far do not appear to be of great importance. The motions are more law-abiding than earthquakes; but it is impossible to say yet whether their systematic study will enable us to foretell an earthquake, although from examples quoted it appears that earthquakes are frequently preceded by great microseismic activity. Nor is the cause of these constant movements understood. Among the theories on this subject mentioned by Prof. Milne is one that they may be due to slight vibratory motions produced in the soil by the bending and crackling of rocks caused by their rise upon the relief of atmospheric pressure. Rossi thinks they may be the result of an increased escape of vapour from the molten material beneath the crust of the earth consequent upon a relief of external pressure. In the same number Dr. Du Bois writes on the great earthquake of Ischia; and a catalogue of earthquakes in Tokio between July 1883 and May 1884, as observed by a Palmieri's seismograph, is also given. From the annual report of the Society we observe that the committee appointed to report on a system of earthquake observations give as their conclusion that the most important observation is that of time, and experiments are now being carried out to obtain a suitable clock for this purpose. The next number is to contain an important paper by Prof. Milne giving a detailed account, with a series of maps, of 387 earthquakes recently felt in Northern Japan.

MR. SPENCE PATERSON, H.B.M. Consul at Reykjavik, writes to the *Standard* that on September 9 he visited Cape Reykjanes, the south-west point of Iceland, in order to observe the volcanic island which recently appeared off that Cape. It was first seen by the light-keeper at Reykjanes on July 29, and had then the shape of an irregular truncated cone, with a slight hollow on the top and a projecting shoulder on the north side. No earthquakes or other volcanic manifestations accompanied its appearance, but on August 5 a series of severe shocks occurred, which split the walls of the lighthouse and damaged the lamps. For several days rain and fog obscured the island; when next seen, its shape had altered; part of the south side had fallen down into the sea, forming two little mounds, and leaving a steep, almost perpendicular face on the south. The height of the island is about two-thirds of its length. It lies about west-south-west of Reykjanes. Two officers of a French war-vessel, who recently visited Reykjanes, estimate its distance from the coast at nine or

ten miles, but Mr. Paterson believes it to be considerably greater. When first seen, the upper part of the island was perfectly black, but it has now begun to whiten, owing to the droppings of the myriads of sea-fowl which frequent the adjacent coast and neighbouring islands, and seem already to have taken possession of the new land. The neighbourhood of Reykjanes is noted for volcanic manifestations—lands have from time to time risen and sunk there, and only a couple of years ago a violent eruption occurred near the spot where the new island lies; columns of smoke and steam rose out of the sea, and large quantities of pumice were thrown up and floated ashore on the neighbouring coast.

It is stated that in consequence of the immense success obtained by the opening of the Arlberg Tunnel, France has confidentially sounded the Swiss Federal Council as to piercing the Alps at the Simplon.

A FATAL gas explosion took place in Paris four months ago near the Porte St. Denis, under circumstances quite similar to the accident which took place in Bermondsey last week. Since that time the Prefet de la Seine has appointed a Commission to determine the best manner of searching for gas escapes. An electric lamp fed with a portable accumulator has been selected and rendered obligatory for such operations. This apparatus has been described at length in the French illustrated papers. It might perhaps be improved, but the principle is quite sound, and it is to be regretted that the results of the French experiments have not become known in England.

WE have received a communication from Prof. M. Nyrén, Director of the Imperial Observatory at Pulkowa, near St. Petersburg, informing us that the weather there was so cloudy that not a vestige of the moon could be seen on the occasion of the recent total eclipse. In Helsingfors, where Prof. Nyrén happened to be that night on his return journey from abroad, he could distinguish the darkening of the moon's disk through the clouds, but it was too thick to observe the eclipse of the stars. At Dorpat, the second great Russian Observatory, the weather was also entirely unfavourable for observations. This is greatly to be regretted, in view of the elaborate preparations made by the Russian astronomers, to which we referred last week.

THE Royal Bohemian Society of Sciences will celebrate its hundredth anniversary at Prague on December 6 next.

THE new University building at Vienna was completed on the 11th inst. The new building at Strasburg will be inaugurated on the 26th inst.

THE death is announced of Dr. Robert Ave-Lallemant, well known as a traveller in Brazil, who was born at Lübeck in 1812. He died there on October 10. Also of Dr. Wilhelm Gonnermann, a naturalist who, together with Dr. Rabenhorst edited the celebrated "Mycologia Europæa." He died at Coburg, aged seventy-eight years.

THE French Minister of Public Instruction has commissioned M. Brau de St. Paul Lias to proceed to Malacca and Sumatra for the purpose of making natural history collections. M. Étienne Gautier is to do the same in Persia and Asiatic Turkey; and Dr. Guardia goes to the Balearic Isles to study the dialect there.

THE life of a Ceylon planter appears to be a constant contest with insect pests of one kind and another. A short time since we noticed a correspondence on a "blight" which attacked the tea-plant, and now the Ceylon papers which arrived by the last mail contain a report, by Dr. Trimen, the head of the Botanic Gardens in the colony, on an insect which has caused much alarm by its depredations on cacao and cinchona plantations.

He thinks the only serious damage to cacao comes from the *Helopeltis antonii*, which appears to be a recent importation to Ceylon, although well known in Java. It is believed to be still in small numbers, and to be confined to certain localities, and the only remedy suggested by Dr. Trimen is that the planters should have it carefully sought for and destroyed.

WE are requested to announce that in future the ordinary meetings of the Essex Field Club will be held in the large hall of the Public Hall, Loughton, Essex. The first meeting of the winter session will be on Saturday next, the 25th inst., at seven o'clock.

A SOCIETY has been established at Vladivostok in Eastern Siberia for the purpose of exploring the Amour district, with a view of founding in Vladivostok a museum illustrative of the natural history of the region.

THE additions to the Zoological Society's Gardens during the past week include a Meadow Pipit (*Anthus pratensis*), six Twites (*Linota flavivestris*), a Linnet (*Linota cannabina*), eight Lesser Redpolls (*Linota rufescens*), British, presented by Mr. T. E. Gunn; two Robben Island Snakes (*Coronella phocaenae*) from South Africa, presented by the Rev. G. H. R. Fisk, C.M.Z.S.; a Hardwick's Mastigure (*Uromastix hardwickii*) from India, presented by Mr. Cuthbert Johnson; a Moustache Monkey (*Cercopithecus cephus*) from West Africa, a Greater Sulphur-crested Cockatoo (*Cacatua sulphurea*) from Australia, a Blue and Yellow Macaw (*Ara ararauna*) from South America, deposited; six Coypus (*Myopotamus coypus*), three Cockateels (*Calopsitta novaehollandiae*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

WOLF'S COMET.—The observations of this comet to the end of September having been found irreconcilable with parabolic motion, Prof. Krueger, the editor of the *Astronomische Nachrichten*, and Mr. S. C. Chandler, jun., of Harvard College, have investigated the elements by a general method, and find an elliptic orbit of very limited dimensions, the period of revolution being 6.55 years by Prof. Krueger's calculation, and 6.65 years by Mr. S. C. Chandler's. Other elements by the former calculation are as follows:—

Perihelion passage 1884 November 17.8999 G.M.T.

Longitude of perihelion	19° 20' 56"	} M. Eq. 1884.0
" ascending node	206° 35' 35"	
Inclination	25° 3' 54"	
Angle of eccentricity	33° 32' 27"	
Log. semi-axis major	0.544040	
Log. perihelion distance	0.194792	

In such an orbit there would be a very close approach to the orbit of Jupiter in about 209° heliocentric longitude, where the distance between the two would be less than 0.12, and with Prof. Krueger's period of revolution there would be great perturbation early in the year 1875, so that it is possible the comet may not have been moving long in its present track. It will be interesting to examine this point further, when the major axis of the comet's orbit has been more accurately determined by a wider extent of observation.

We have thus two comets of short period brought to light in the same year. As regards Barnard's comet the length of revolution appears to be yet somewhat doubtful, Prof. Morrison of Washington assigning 6.43 years, and Dr. Berberich of Strasburg 5.50 years only.

THE NOVEMBER METEORS.—Assuming that these bodies are moving strictly in the orbit of the first comet of 1866, we find by Prof. Oppolzer's definitive elements that the nearest approach to the orbit of Mars is in about heliocentric longitude 0° 5', distance 0.30; the nearest approach to the orbit of Jupiter is in 198° 7', distance 0.79; in the case of Saturn the least distance of orbits is 0.46 at 214° 9'; and in that of Uranus 0.37 at 234° 2'. In 1866 the comet traversed the plane of the earth's orbit in 51° 4', distant therefrom only 0.0066.